

PATENT SPECIFICATION

DRAWINGS ATTACHED

835,236



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COMPLETE SPECIFICATION

Method and Apparatus for Incorporating Two or more Different or Differently Coloured Flowable Plastic Substances into One Mass to Produce a Variegated Effect in the Mass

I, GERALD GEORGE BALCH, of 1301, Adams Street, Pittsburgh, 33, Pennsylvania, United States of America, a Citizen of the United States of America, do hereby declare the invention, for which I pray that a patent may be granted me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a method and apparatus for incorporating two or more different or differently coloured flowable plastic substances into one mass to produce a variegated effect in the mass, and has particular reference to the production of ice creams of variegated colour and/or flavour although it may be applied to analogous uses.

According to this invention there is provided a method for incorporating two or more different or differently coloured flowable plastic substances into one and the same mass to produce a variegated effect or appearance therein, such method comprising producing an annular stream of one of the substances and introducing the other or another substance to the interior of the said annular stream under pressure in a single jet or stream or in a plurality of jets or streams and thereafter reducing the overall cross-sectional area of the combined stream of the said substances by constricting the flow path thereof.

Preferably, and according to a feature of the invention, the said substance forming the said annular stream may be permitted to expand prior to the introduction thereof of the said other or another of the substances.

Desirably the said other or another of the substances is fed coaxially through the stream of the first named substance and is discharged into the stream of the first named substance.

The said streams or jets are preferably arranged at regular intervals around the axis of the stream of the first named substance. Desirably the said streams or jets of the said

other or another of the substances are discharged near, but somewhat spaced from, the outer periphery of the stream of the first named substance.

Preferably the said other or another of the substances is discharged into the stream of the first named substance adjacent to or in the region of a constriction in the flow path of the combined substances, such constriction producing the aforementioned restriction to flow of the combined substances and producing a compression of the latter.

The invention also resides in the apparatus for carrying out the said method.

Thus, according to a further aspect of the invention, there is provided apparatus for incorporating two or more different or differently coloured flowable plastic substances into one and the same mass to produce a variegated effect or appearance therein, such apparatus comprising a duct into which one of the substances may be fed and along which it may travel under pressure, said duct including a constriction, which may be frusto-conical in shape, at or towards its delivery end to constrict the outflow from said duct and a tubular conduit, stationary with respect to said duct and arranged coaxially within said duct and closed at its delivery end but furnished with one or more discharge nozzles extending outwardly from said tubular inner conduit and extending towards, but ending short of, the internal periphery of the said duct whereby the said other or another substance can be discharged into a stream of the first named substance transversely to the direction of flow of the latter.

Preferably, the or each nozzle extends obliquely downwardly towards and beyond the downstream end of the said conduit, although if desired, the or each nozzle may be radial to the said inner conduit.

Preferably, the or each nozzle is mounted

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as a unit upon a cap or the like which is detachable from the downstream end of the conduit, thereby to facilitate cleaning the apparatus.

5 The or each said nozzle may be arranged on the conduit in a variety of alternative ways.

Thus, for example, a plurality of nozzles may be arranged so as to lie on the surface of an imaginary cone, or they may be arranged
10 in the same plane.

Nevertheless, the said nozzles may, for example, be arranged at intervals helically around the said conduit or in a series of pairs or groups in spaced parallel planes perpendicular to the axis of the conduit; when provided
15 in pairs, each pair of nozzles may conveniently extend along a diameter of the conduit and may be arranged so that the nozzles are provided equi-angularly around such conduit.

20 According to another feature of the invention, the outer ends of the said nozzles may be chamfered off on the side opposite to the delivery end of the duct 1 containing said inner conduit.

25 Preferably, the said conduit is completely removable from the said duct for cleaning purposes, and suitable means may be provided for centralising the conduit in the duct.

Moreover, whatever the arrangement of the
30 nozzles may be, a cap or the like may be mounted detachably on the downstream end of the conduit so as thereby further to facilitate the cleaning of the apparatus.

Conveniently the first named substance is
35 supplied to the said duct through a lateral inlet branch but, in any case, it is preferably supplied to the duct at a pressure in excess of that which obtains in the stream within the duct, this conveniently being achieved by
40 using a duct having a diameter substantially greater, e.g. $2\frac{1}{2}$ times, that of the diameter of the inlet branch itself.

The said conduit is naturally substantially
45 smaller in diameter than the said duct and conveniently may have an internal diameter of $\frac{3}{4}$ " against the internal diameter of $2\frac{1}{4}$ " of the duct, said nozzles preferably ending $\frac{1}{4}$ " from the inner wall of the said duct 1 and each individual nozzle conveniently having an
50 internal diameter of about $\frac{1}{4}$ ".

In order that the invention may be more readily understood one embodiment of the apparatus as used for the production of ice cream and a modification of the apparatus
55 will now be described by way of example and with reference to the accompanying drawings in which:—

Figure 1 is a perspective view of one
60 embodiment of the apparatus of the invention;

Figure 2 is a perspective view of the conduit of the apparatus of Figure 1;

Figure 3 is a vertical section of the apparatus of Figure 1; and

65 Figure 4 shows a modification of the

embodiment of Figures 1, 2 and 3, in which the nozzles are of modified form.

The apparatus to be described is for the production of ice cream of variegated effect or appearance by incorporating into one and the
70 same mass two flowable plastic substances, namely ice cream and a sauce.

In the embodiment shown in Figures 1 to 3, the apparatus is conveniently formed of steel or other suitable non-corrodable or
75 untarnishable metal and comprises a main cylindrical duct 1 which has a bore 2 extending substantially from end to end but which is furnished, at its ends, with conical annular seatings 3 and 4. At each end, the duct is
80 externally screw threaded at 5 and 6 respectively to receive a union nut 7 or 8 of which one is provided at each end of the duct.

Rather nearer to its upper than its lower end, the duct 1 is furnished with an inlet
85 branch 9 which is perpendicular to the axis of the duct and which has an internal diameter much smaller than the internal diameter of the duct itself, the latter diameter preferably being about $2\frac{1}{2}$ " whilst that of the inlet
90 branch is about 1". The ice cream inlet branch 9 is externally screw threaded at its outer end 10 to enable an inlet pipe (not shown) to be detachably connected thereto.

In the lower end of the duct of the apparatus is detachably fitted an outlet pipe 11 of
95 smaller internal diameter than that of the bore of the duct itself, the internal diameter of this outlet pipe being conveniently about 1". This outlet pipe 11 has an enlarged upper end or head 12 and the upper part of its bore is flared or enlarged gradually upwardly up to the internal diameter of the bore of the duct itself, the upper end 13 of the bore of the outlet pipe 11 thus being of conical form.
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The enlarged head 12 of the outlet pipe 11 is furnished with an external annular chamfer 14 to seat against the conical annular seating 4 of the duct 1 against which it is sealed with the aid of the lower union nut 8 on this duct, this union nut 8 engaging below the head 12 of the outlet pipe 11 and being rotatable upon the latter so that, as the nut 8 is screwed on to the duct 1, the outlet pipe 11 is drawn into fluid-tight seal therewith.
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Within the duct 1 of the apparatus is coaxially located a sauce conduit 15 which extends downwardly into the duct 1 to a position closely adjacent to, or actually within, the restricted conical upper portion of the outlet pipe 11 of the apparatus. This sauce conduit 15 is furnished at its upper end with a wide annular flange 16 of annular chamfered form on the under part 17 of its periphery so as to seat in a fluid-tight manner against
125 the annular conical seating 3 of the duct 1 against which it is tightened by the upper union nut 7 which is rotatably mounted upon the annular flange 16 of the sauce conduit 15. Above the annular flange 16, the sauce con-
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duit 15 is furnished with an upwardly directed extension 18 suitably screw threaded at 19 to enable a sauce supply pipe (not shown) to be connected thereto.

5 The annular flange 16 centralises the sauce conduit 15 within the duct 1 but, in order additionally to centralise this conduit, the conduit 15 is provided with four radial pins 20 arranged spider fashion therearound and engaging the inner circumferential surface of the duct.

A cup-shaped cap 21 is detachably fitted on to the lower end of the sauce conduit 15 either by means of a bayonet slot connection 22 as shown or by screw means. When the cap 21 is applied to the sauce conduit 15, the arrangement is such that sauce passing down the conduit has free access to the interior of the cap and to the inner ends of a plurality of radially arranged nozzles 23 disposed at intervals equi-angularly around the cap, these nozzles extending from the cap 21 at right-angles to the axis of the latter and to within a short distance, e.g. about $\frac{1}{8}$ " of the inner periphery of the duct 1 and being cut back or chamfered at the upper parts 24 of their outer ends 25 so that sauce ejected by the nozzles meets the ice cream flowing through the duct over an oblique surface and not only at the extreme ends of the nozzles.

In using the above-described apparatus of the above described form, the ice cream inlet branch 9 is connected to a supply of ice cream at a substantial pressure whilst the extension 18 of the sauce conduit is connected to a supply source feeding the sauce under pressure. The ice cream enters the duct 1 and flows around the sauce conduit 15 and, since the upper end of the duct is closed, flows downwardly over the sauce conduit 15 towards the restricted upper end 13 of the outlet pipe 11 of the apparatus. Due to the greatly increased diameter of the duct with respect to the inlet branch 9, the ice cream expands within the duct 1 and is in an expanded state as it passes around the sauce discharge nozzles 23. Thereafter the flow path of the ice cream is restricted by virtue of the convergent upper end 13 of the outlet pipe 11 of the apparatus which leads the ice cream into the more restricted part of the outlet pipe. As the ice cream reaches, or as it passes through, the said restricted zone of the flow path, the sauce is discharged radially into the ice cream just within the periphery of the stream, the sauce is accelerated and stretched as the ice cream and sauce pass through the outlet pipe 11, and, due to the composite motion of the sauce and ice cream, and the subsequent delivery of the ice cream into packages, there is produced within the composite material an attractive, clear-cut and well-defined variation in the colour or appearance or even taste from part to part, preferably wholly within the external surface of the ice cream which

will preferably finish with a homogeneous texture and appearance.

It will be appreciated, of course, that the ice cream can be delivered from the outlet pipe 11 into cylindrical, square, oblong, or other shaped packages as desired.

Figure 4 shows a modification of the embodiment of the apparatus shown in Figures 1 to 3. In this modification the cap 26 for fitting on to the lower end of the sauce conduit 15 is of substantially cylindrical form but has a frusto-conical closed end 27. Moreover, in contrast to the nozzles 23 shown in Figures 2 and 3, the nozzles 28 of the modification shown in Figure 4 extend, when the cap 26 is arranged on the sauce conduit 15, obliquely downwardly towards the delivery end of the said duct containing said inner conduit so that they lie on the surface of an imaginary cone whose axis coincides in use with the axis of the sauce conduit 15. The ends 29 of the nozzles 28 are not chamfered off as described in connection with the nozzles 23.

WHAT I CLAIM IS:—

1. A method for incorporating two or more different or differently coloured flowable plastic substances into one and the same mass to produce a variegated effect or appearance therein, such method comprising producing an annular stream of one of the substances and introducing the other or another substance to the interior of the said annular stream under pressure in a single jet or stream or in a plurality of jets or streams and thereafter reducing the overall cross-sectional area of the combined stream of the said substances by constricting the flow path thereof.

2. A method according to Claim 1, wherein the said substance forming the said annular stream is allowed to expand prior to introducing the other or another substance into it.

3. A method according to Claim 1 or 2, wherein the said other or another substance is introduced into the first named substance in radial outwardly divergent jets or streams transverse to the direction of flow of the first named substance.

4. A method according to Claim 1 or 2, wherein the said other or another substance is introduced into the first named substance in radial outwardly divergent jets or streams at right angles to the direction of flow of the first named substance.

5. A method according to Claim 3 or 4, wherein the said jets or streams are arranged at regular intervals around the stream of the said other or another substance.

6. A method according to any of the preceding claims, wherein the said other or another substance is introduced into the stream of the first named substance adjacent to or in the region of a constriction in the flow path of the combined streams.

7. Apparatus for incorporating two or more

- different or differently coloured flowable plastic substances into one and the same mass to produce a variegated effect or appearance therein, such apparatus comprising a duct into which one of the substances may be fed and along which it may travel under pressure, said duct including a constriction, which may be frusto-conical in shape, at or towards its delivery end to constrict the outflow from said duct and a tubular conduit, stationary with respect to said duct and arranged coaxially within said duct and closed at its delivery end but furnished with one or more discharge nozzles extending outwardly from said tubular inner conduit and extending towards, but ending short of, the internal periphery of the said duct, whereby the said other or another substance can be discharged into a stream of the first named substance transversely to the direction of flow of the latter.
8. Apparatus according to Claim 7, wherein the outer end of each nozzle is chamfered off on the side opposite to the delivery end of said duct which contains said inner conduit.
9. Apparatus according to Claim 7, wherein the or each said nozzle extends obliquely towards the delivery end of the said duct containing the said tubular inner conduit.
10. Apparatus according to Claim 9, wherein the said nozzles are arranged so as to be on the surface of an imaginary cone having its axis coincident with the axis of the said inner conduit.
11. Apparatus according to Claim 7, wherein the said nozzles are all in the same plane.
12. Apparatus according to Claim 7, wherein the or each nozzle is radial to the said duct.
13. Apparatus according to any of Claims 7 to 12, wherein the or every nozzle is mounted on a single cap or the like which is detachable from the end of the inner conduit adjacent to or in the region of the delivery end of said duct containing said inner conduit.
14. Apparatus according to any one of Claims 7 to 13, wherein the said conduit is completely removable from the said duct.
15. Apparatus according to any one of Claims 7 to 14, wherein two or more radial pins are arranged spider fashion around the said conduit and engaging the inner circumferential surface of the duct in order to centralise the conduit in the duct.
16. A method for making ice cream of variegated effect or appearance, substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.
17. Apparatus for making ice cream of variegated effect or appearance, substantially as hereinbefore described with reference to and as shown in Figures 1 to 3 of the accompanying drawings.
18. Apparatus according to Claim 17, modified substantially as hereinbefore described with reference to and as shown in Figure 4 of the accompanying drawings.
19. Ice cream when prepared using the method of any one of Claims 1 to 6 and 16 or using the apparatus of any one of Claims 7 to 15, 17 and 18.
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PROVISIONAL SPECIFICATION

Method and Apparatus for Incorporating Two or more Different or Differently Coloured Flowable Plastic Substances into One Mass to Produce a Variegated Effect in the Mass

- I, GERALD GEORGE BALCH, of 1301, Adams Street, Pittsburgh, 33, Pennsylvania, United States of America, a Citizen of the United States of America, do hereby declare this invention to be described in the following statement:—
- This invention concerns a method and apparatus for incorporating two or more different or differently coloured flowable plastic substances into one mass to produce a variegated effect in the mass, and has particular reference to the production of ice cream of variegated colour and/or flavour although it may be applied to analogous uses.
- According to this invention, there is provided a method for incorporating two or more different or differently coloured flowable plastic substances, e.g. ice cream and an immiscible sauce, into one and the same mass to produce a variegated effect or appearance therein, such method comprising producing a stream of one of the substances (hereinafter referred to as "ice cream") and introducing the other or another of the substances (hereinafter referred to as "the sauce") into the stream of ice cream transversely of the direction of flow of the latter, and then restricting the flow path of the combined stream of ice cream and sauce.
- Preferably, and according to a further feature of the invention, the stream of ice cream is permitted to expand prior to the introduction thereto of the sauce.
- Desirably the sauce is fed coaxially through the stream of ice cream and is then discharged outwardly and transversely from the interior

of the stream of ice cream towards the exterior of the latter.

According to another feature of the invention, the sauce is discharged into the ice cream in a plurality of streams or jets preferably arranged at regular intervals around the axis of the stream of ice cream. Desirably the said streams or jets of sauce are discharged radially of the stream of ice cream and discharged preferably near, but somewhat spaced from, the outer periphery of the stream of ice cream.

Preferably the sauce is discharged transversely into the stream of ice cream adjacent to or in the region of a constriction in the flow path of the combined substances, such constriction producing the aforementioned restriction to flow of the combined ice cream and sauce and producing a compression of the latter.

The invention also resides in the apparatus for carrying out the said method.

Thus, according to a further aspect of the invention, there is provided an apparatus for performing the said method and which comprises a duct into which ice cream may be fed and along which it may travel under pressure, said duct including a constriction at or towards its delivery end to constrict the outflow of such ice cream from the duct, and a sauce supply conduit arranged coaxially within said duct and furnished with one or more outwardly directed transverse discharge nozzles whereby sauce fed through the said sauce conduit can be discharged into a stream of ice cream transversely of the direction of the flow of the latter.

Preferably, the said nozzles extend towards, but end short of, the internal periphery of the said duct. Moreover, the nozzles are preferably radial to this duct.

The said nozzles may be arranged on the said sauce conduit in a variety of alternative ways. Thus, in a preferred arrangement, they are all arranged in the same plane and are preferably mounted as a unit upon a cap or the like which is detachable from the downstream end of the sauce conduit, thereby to facilitate cleaning the apparatus.

Nevertheless, the said nozzles may, for example, be arranged at intervals helically around the said sauce conduit or in a series of pairs or groups in spaced parallel planes perpendicular to the axis of the sauce conduit; when provided in pairs, each pair of nozzles may conveniently extend along a diameter of the conduit and may be arranged so that the nozzles are provided equi-angularly around such conduit.

According to another feature of the invention, the outer ends of the said nozzles are preferably chamfered off on the upstream side thereof.

Preferably, the said sauce conduit is completely removable from the said duct for cleaning

purposes, and suitable means may be provided for centralising the sauce conduit in the duct.

Moreover, whatever the arrangement of the nozzles may be, a cap or the like may be mounted detachably on the down-stream end of the sauce conduit so as thereby further to facilitate the cleaning of the apparatus.

Conveniently the ice cream is supplied to the said duct through a lateral inlet branch but, in any case, it is preferably supplied to the duct at a pressure in excess of that which obtains in the stream within the duct, this conveniently being achieved by using a duct having a diameter substantially greater, e.g. $2\frac{1}{2}$ times, that of the diameter of the inlet branch itself.

The said sauce conduit is naturally substantially smaller in diameter than the said duct and conveniently may have an internal diameter of $\frac{3}{4}$ " against the internal diameter of $2\frac{1}{2}$ " of the duct, said nozzles preferably having an overall radius of approximately $1\frac{1}{2}$ " and each individual nozzle conveniently having an internal diameter of about $\frac{1}{4}$ ".

In order that the invention may be more readily understood one embodiment of the apparatus will now be described by way of example.

In this embodiment, the apparatus is conveniently formed of steel or other suitable non-corrodable or untarnishable metal and comprises a main cylindrical duct which has a bore extending substantially from end to end but which is furnished, at its ends, with conical annular seatings. At each end, the duct is externally screw threaded to receive a union nut of which one is provided at each end of the duct.

Rather nearer to its upper than its lower end, the duct is furnished with an inlet branch which is perpendicular to the axis of the duct and which has an internal diameter much smaller than the internal diameter of the body or duct itself, the latter diameter preferably being about $2\frac{1}{2}$ " whilst that of the inlet branch is about 1". The inlet branch is externally screw threaded at its outer end to enable an inlet pipe to be detachably connected thereto.

In the lower end of the duct of the apparatus is detachably fitted an outlet pipe of smaller internal diameter than that of the bore of the duct itself, the internal diameter of this outlet pipe being conveniently about 1". This outlet pipe has an enlarged upper end and the upper part of its bore is flared or enlarged gradually upwardly up to the internal diameter of the bore of the duct itself, the upper end of the bore of this outlet pipe thus being of conical form.

The enlarged head of the outlet pipe is furnished with an external annular chamfer to seat against the conical annular seating of the duct of the apparatus against which it is

sealed with the aid of the lower union nut on this duct, this union nut engaging below the head of the outlet pipe and being rotatable upon the latter so that, as the nut is screwed on to the duct, the outlet pipe is drawn into fluid-tight seal therewith.

Within the duct of the apparatus is coaxially located a sauce conduit which extends downwardly into the duct to a position closely adjacent to, or actually within, the restricted conical upper portion of the outlet pipe of the apparatus. This sauce conduit is furnished at its upper end with a wide annular flange of annular chamfered form on the under part of its periphery so as to seat in a fluid-tight manner against the annular conical seating of the body or duct against which it is tightened by the upper union nut on the body and which is rotatably mounted upon the said annular flange of the sauce conduit. Above the said annular flange, the sauce conduit is furnished with an upwardly directed extension suitably screw threaded to enable a sauce supply pipe to be connected thereto.

Said annular flange centralises the sauce conduit within the duct but, in order additionally to centralise this conduit, the conduit may be provided with a number of radial pins arranged spider fashion therearound and engaging the inner circumferential surface of the duct. A cup-shaped cap is detachably fitted on to the lower end of the sauce conduit either by screwing thereon or by means of a bayonet slot connection which is the preferred method of construction. When this cap is applied to the sauce conduit, the arrangement is such that sauce passing down the conduit has free access to the interior of the cap and to the inner ends of a plurality of radially arranged nozzles disposed at intervals equi-angularly around the cap, these nozzles extending from the cap at right angles to the axis of the latter and to within a short distance, e.g. about $\frac{1}{8}$ " of the inner periphery of the duct and being cut back or chamfered at the upper parts of their outer ends so that sauce ejected by the nozzles meets the ice cream flowing through the duct over an oblique surface and not only at the extreme ends of the nozzles.

In using the apparatus of the above described form, the ice cream inlet branch is connected to a supply of ice cream at a substantial pressure whilst the end of the sauce conduit is connected to a supply source feeding the sauce under pressure. The ice cream enters the duct and flows around the sauce conduit and, since the upper end of the duct is closed, flows downwardly over this sauce conduit towards the restricted upper end of the outlet pipe of the apparatus. Due to the greatly increased diameter of the duct with respect to the inlet pipe or branch, the ice cream expands within the duct and is in an expanded state as it passes around the aforementioned sauce discharge nozzles. Thereafter the flow path of the ice cream is restricted by virtue of the convergent upper end of the outlet pipe of the apparatus which leads the ice cream into the more restricted parts of the outlet pipe. As the ice cream reaches, or as it passes through, the said restricted zone of the flow path, the sauce is discharged radially into the ice cream just within the periphery of the stream, the sauce is accelerated and stretched as the ice cream and sauce pass through the outlet pipe, and due to the composite motion of the sauce and ice cream, and the subsequent delivery of the ice cream into packages, there is produced within the composite material an attractive, clear-cut and well-defined variation in the colour or appearance or even taste from part to part, preferably wholly within the external surface of the ice cream which will preferably finish with a homogeneous texture and appearance.

It will be appreciated, of course, that the ice cream can be delivered from the outlet pipe into cylindrical, square, oblong, or other shaped packages as desired.

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Fig. 1.

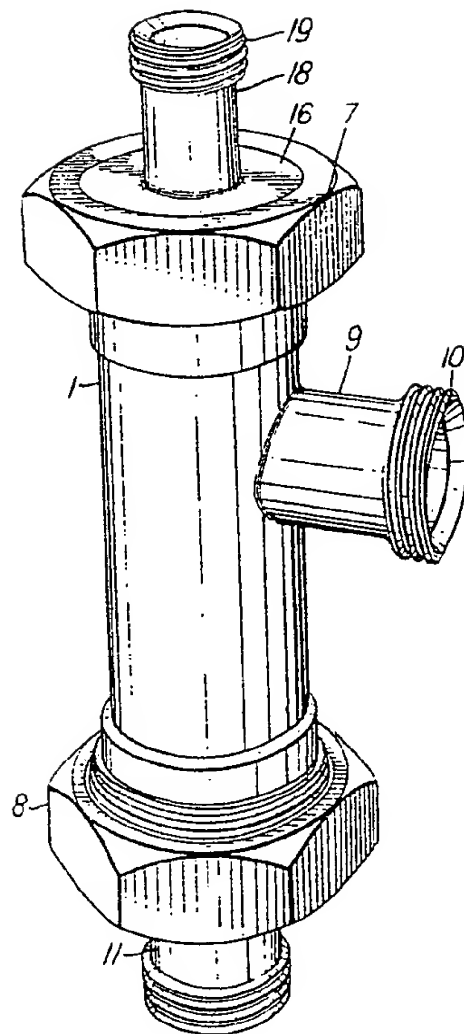
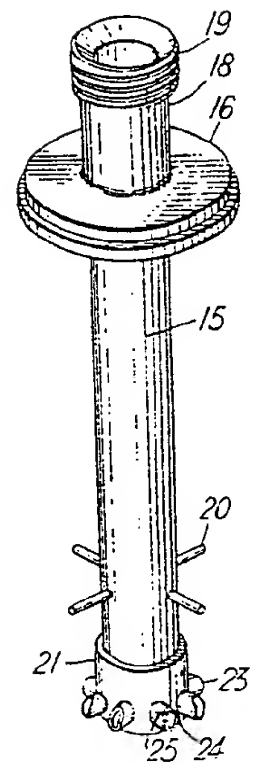


Fig. 2.

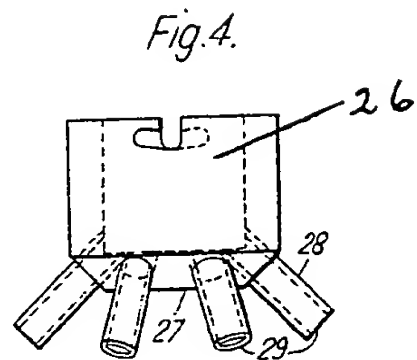
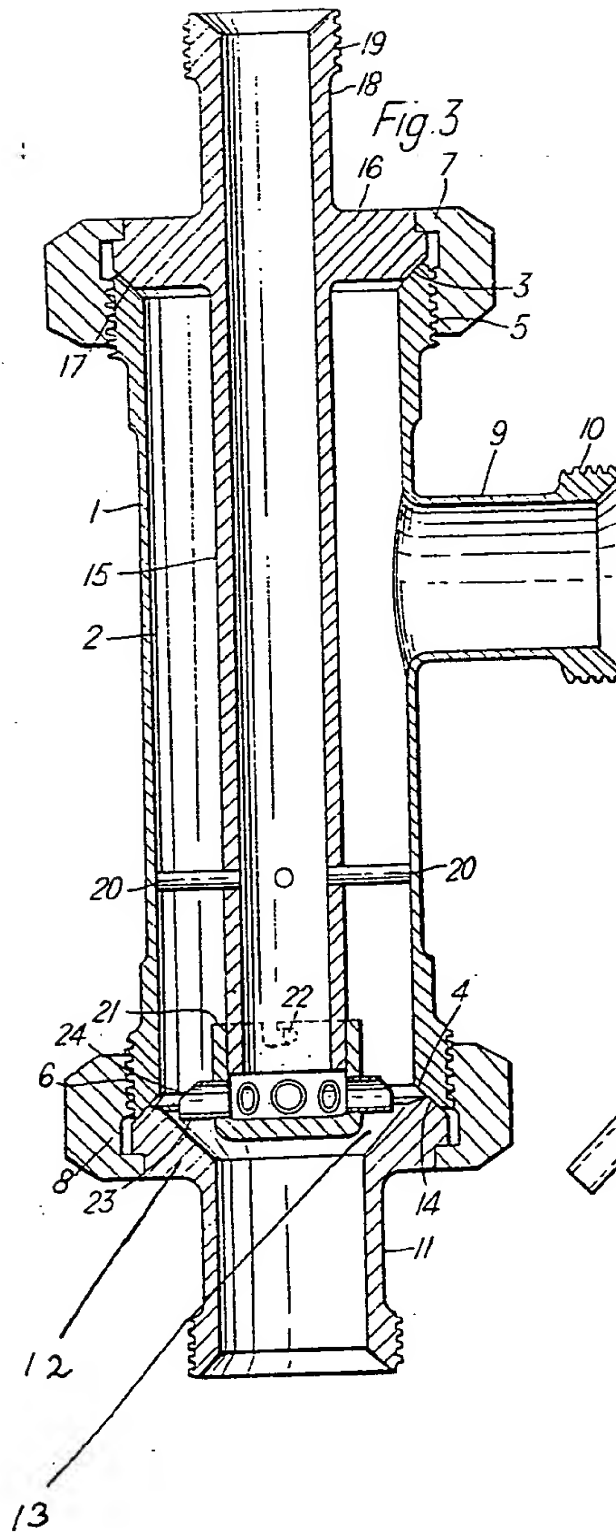


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SHEETS 1 & 2



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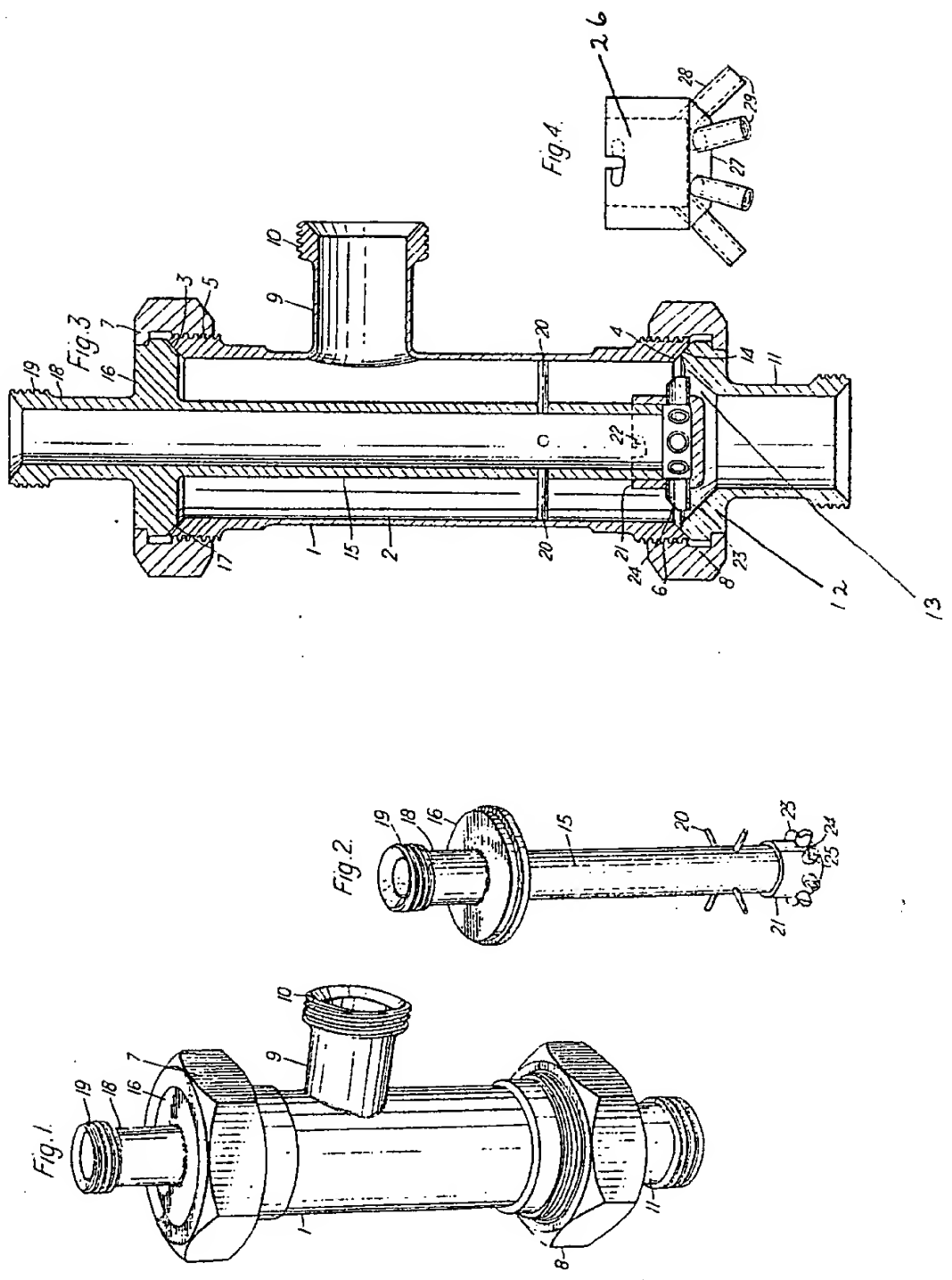


Fig. 1.

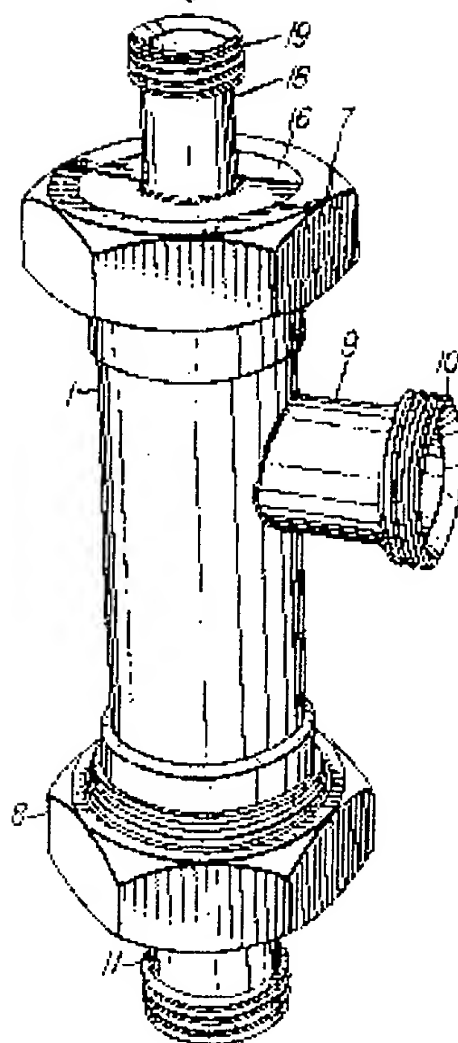
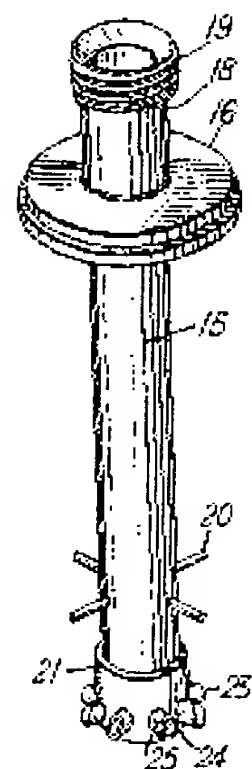


Fig. 2.

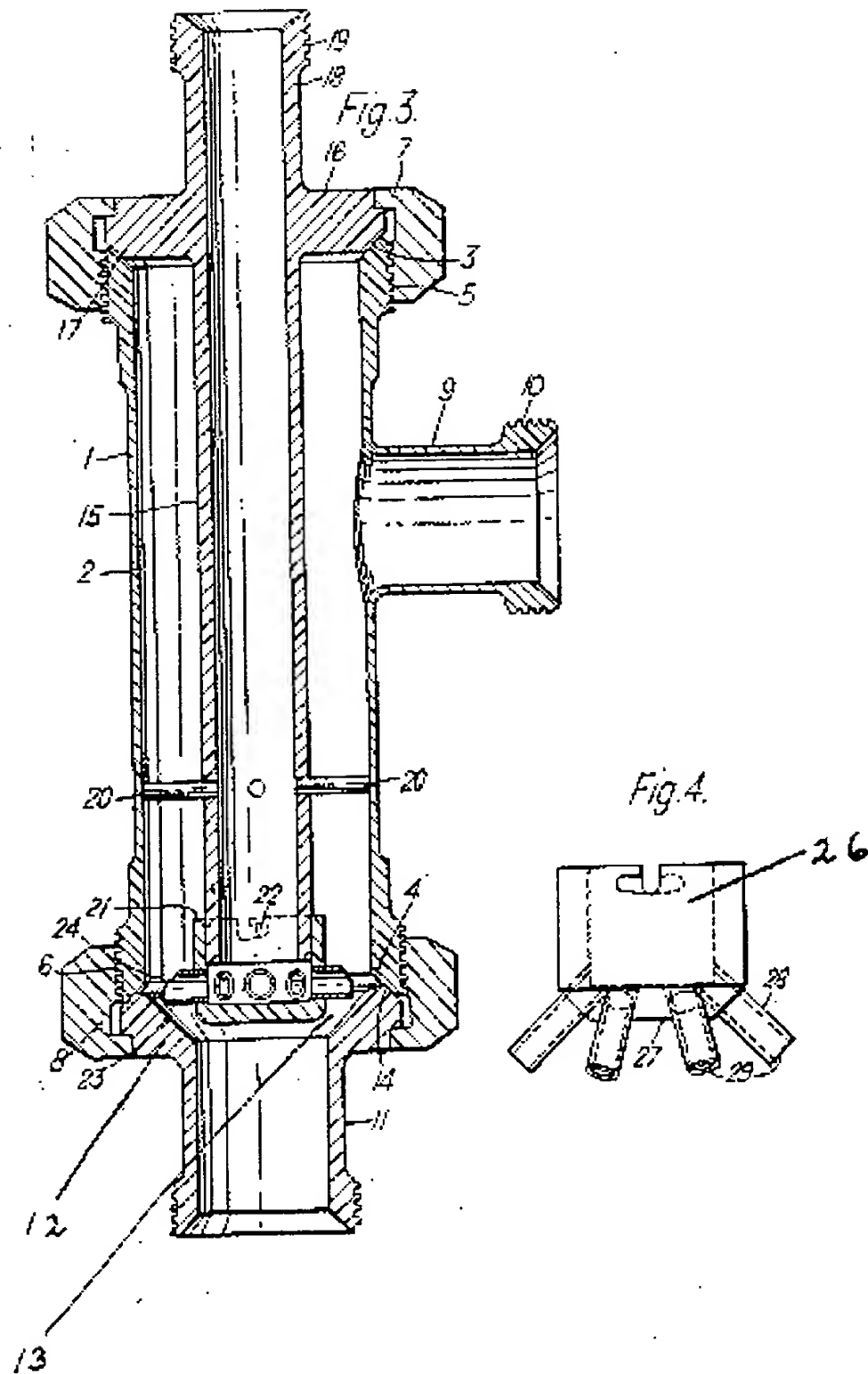


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